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REVIEW

Does parental involvement make a difference in school-based nutrition and physical activity interventions? A systematic review of randomized controlled trials

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Abstract

Objectives Parental involvement is often advocated as important for school-based interventions, however, to date, only inconsistent evidence is available. Therefore, this study aimed at determining the impact of parental involvement in school-based obesity prevention interventions in children and adolescents.

Methods A systematic review of obesity prevention studies published from 1990 to 2010 including a comparison between school-based interventions with and without parental component was conducted. Only studies reporting effects on health behaviour-related outcomes were included.

Results Some positive effects of parental involvement were found on children's behaviours and behavioural determinants. Parental modules including different strategies and addressing several home-related determinants and parenting practices concerning eating and physical activity behaviours were more likely to be effective. However, no conclusive evidence could be provided concerning the added value of parent involvement, because of the paucity of studies to test this hypothesis. The few studies that are available provide inconsistent evidence.

Conclusions There is a need for more studies comparing school-based interventions with and without a parental component, and dose, strategies and content of parental components of school-based interventions should be better reported in articles.

Keywords Obesity · Children · Parents · Health promotion · Nutrition · Physical activity · Prevention

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Introduction

Childhood overweight and obesity are major determinants of ill health in childhood and later life and the prevalence has increased dramatically during the last decades (Lobstein et al. 2004; Reilly et al. 2010). The school environment is recognized as an important setting for childhood health promotion interventions, and reviews have found that well-designed and well-implemented school-based interventions can have positive effects on children's nutrition and physical activity behaviours (Stone et al. 1998; Van Cauwenberghe et al. 2010). Nevertheless, parents are regarded as the most important influence on obesogenic health behaviours among children (Commission of European Communities 2007; Story et al. 2006). Children's nutrition and physical activity behaviours are influenced by home-related factors such as feeding styles (pressure to eat, restriction, monitoring, and control of dietary intake), availability and accessibility of healthy

food products, a home environment that stimulates physical activity, parental support and encouragement, parents' role modeling, parents' health behaviours, and general parenting styles (Birch and Ventura 2009; Koplan et al. 2005; Golan and Crow 2004). Moreover, Skouteris et al. (2010) and Lindsay et al. (2006) stated that obesity prevention strategies focusing on changing parental variables related to obesity promoting behaviours are promising. Based on a systematic review of Golley et al. (2010), the variety and number of strategies included in a family-based intervention influence the study effectiveness.

In narrative systematic reviews, it has been repeatedly argued that parental involvement in school-based healthy nutrition and physical activity promotion interventions is important (Lindsay et al. 2006; Peters et al. 2009; Sharma 2006). However, none of the reviews exclusively included studies in which the parental component in the school-based intervention was evaluated separately. Therefore, the contribution of parental involvement to intervention effectiveness could not be determined.

This systematic review provides an overview of school-based obesity prevention programs wherein a school-only group and a school-plus-family intervention group are compared. This article also aims to identify the characteristics of parents who do participate in school-based interventions, and to explore the kind of parental involvement in school-based interventions that may contribute to effectiveness.

Methods

A search was conducted in five electronic databases (Medline, Web of Science, The Cochrane Library, Cinahl, and ERIC) for articles published from 1990 to August 2010. The following search term groups were used: (1) child (6–18 years), e.g. child, adolescent, and schoolchild; (2) home involvement, e.g. parent program and caregiver participation; (3) school-based intervention, e.g. school-based strategy and school-based trial, and (4) obesity, nutrition or physical activity-related behaviours, e.g. overweight, fruit, exercise, walking, snacking, and screen time. The review was restricted to controlled trials with a design in which at least a school-only intervention group was compared with a school-plus-family-intervention-group. Inclusion criteria were (1) English language, (2) focus on behaviours related to obesity risk, (3) healthy children and adolescents (6–18 years) as participants, and (4) inclusion of at least one nutrition or physical activity-related behavioural, or an anthropometrical outcome at the child level. A standardized quality assessment tool was used to appraise the methodological quality (Thomas 2003). Six quality components were scored (strong/moderate/weak): (1) selection bias, (2) study design, (3) confounders, (4) blinding, (5) reliability and validity of data collection tools, and (6) withdrawals and drop-outs. The most important information of the included articles was extracted and summarized in tables. The extracted data included intervention and study characteristics as well as effect indicators. Specific intervention characteristics that have been identified previously by health education experts as being crucial for evaluating evidence on public health interventions were extracted (Altman et al. 2001; Des Jarlais et al. 2004; Jackson 2005; Moher et al. 2001a, b; Rychetnik et al. 2002). These characteristics included specifics about the study design, participants, intervention, context, outcome measures and instruments, effects and process factors. Because of the heterogeneity of studies with respect to interventions, participants, measures and outcomes, no pooled effect sizes were calculated, but a narrative systematic review was conducted.

Results

The literature search resulted in 8,259 published papers. After reviewing the titles, abstracts, or complete articles, five studies met the criteria. Table 1 presents an overview of the included studies. More extensive summaries of the studies and their results are available in the appendix.

Four of the five studies focused on both nutrition and physical activity behaviours. One (Werch et al. 2003) targeted physical activity in combination with alcohol use prevention. Three studies were explicitly informed by health behaviour theory, including the theory of planned behaviour (Ajzen 1985; Haerens et al. 2006a, b; Werch et al. 2003), the transtheoretical model (Prochaska et al. 1992; Haerens et al. 2006a, b), social cognitive theory (Bandura 1986; Edmundson et al. 1996; Werch et al. 2003), health belief model (Becker 1974; Werch et al. 2003), behavioural self-control theory (Kanfer 1975; Werch et al. 2003), social bonding theory (Hirschi 1969; Werch et al. 2003) and the multicomponent motivational stages (McMOS) prevention model (Werch and Diclemente 1994). Intervention duration varied between the interventions, including two interventions with short duration (1.5–3 months) (Hopper et al. 1992, 1996; Werch et al. 2003), one medium–long (1 year) intervention (Vandongen et al. 1995) and two interventions that were continued over a longer period of time (2–3 years) interventions (Edmundson et al. 1996; Luepker et al. 1996, 1998; Lytle et al. 1996; Haerens et al. 2006a). Different school- and home-based strategies were used to change children's health behaviours. In two studies (Hopper et al. 1992, 1996; Vandongen et al. 1995), the school component solely consisted of nutrition and physical education programs.

Table 1 Intervention characteristics of included studies (e.g. information about country, design, methodological quality, and duration of the study, mean age of participants, intervention strategies used in school and family component, theory usage in the study, and parental component effectiveness)

First author/name study (year of intervention; place)	Country	Study design	Methodological study quality	Mean age	Intervention duration	Behaviours addressed	Type of school intervention		Type of family intervention	Theory based	Added effect of parent component
							Education	Environmental			
CATCH (1991; US)	US	Cluster RCT	Strong	8.75	3 years	N, PA, S	HE, PE	SFS	HE, HP, SE, R	+	Dietary knowledge: ++
Vandongen (1990; Australia)	Australia	Cluster RCT	Moderate	11	1 year	N, PA	HE, PE	–	HE, HP, R	–	Health behaviours in general: ++
Hopper (1991; US)	US	Cluster RCT	Weak	11.6	6 weeks	N, PA	HE, PE	–	HE, HP, R	–	Dietary knowledge: ++
Haerens (2003; Belgium)	Belgium	Cluster RCT	Strong	13.1	2 years	N, PA	HC, TF, HE	O, AT, SFS	HE, SE, TF	+	BMI, BMI *z* score, fat intake: ++
Werch (2001; US)	US	RCT	Strong	13.2	3 months	PA, A	–	HE, TF	HE	+	0

CATCH the child and adolescent trial for cardiovascular health, *RCT* randomized controlled trial, *N* nutrition, *PA* physical activity, *S* smoking, *A* alcohol consumption, *HE* health education, *PE* physical education, *HC* health checks/motor test, *TF* tailored feedback, *O* more opportunities for PA outside classes, *AT* active travel promotion, *SFS* school food service modifications, *SE* school events, *R* rewards for family participation, *HP* home packets that promote practical family activities concerning diet and PA, *BMI* Body Mass Index

+, present in study; –, not present in study; ++, positive effect was found; 0, no effect was found

The CATCH intervention additionally included environmental changes. This was also the case in the study of Haerens and colleagues (2006a, b; 2007a, b), wherein both food service and physical environment changes were aimed for supplemented with a computer-tailored health education intervention. Tailored advice was also provided in the study of Werch and colleagues (2003). Regarding the home component, three studies included similar strategies to reach parents, namely take-home packets of learning materials and instructions for family activities and small rewards to encourage family involvement (Edmundson et al. 1996; Luepker et al. 1996, 1998; Lytle et al. 1996; Hopper et al. 1992, 1996; Vandongen et al. 1995). One study also organized school events for parents (Edmundson et al. 1996; Luepker et al. 1996, 1998; Lytle et al. 1996). Haerens and colleagues (2006a, b, 2007a, b) offered a computer-tailored intervention, educational materials, and an interactive meeting, while Werch and colleagues (2003) only provided educational materials. Two studies provided information about the dose of parental participation. In both studies, the majority of the parents conducted the home activities together with their children (Edmundson et al. 1996; Luepker et al. 1996, 1998; Lytle et al. 1996; Werch et al. 2003). Exploration of the parental components revealed that four studies focused on changing parents' knowledge, skills, awareness, role modeling, and parent–child interaction concerning physical activity and nutrition behaviours. Haerens and colleagues (2006a, b, 2007a, b) also included other psychosocial determinants, such as parents' self-efficacy and attitude. Werch and colleagues (2003) targeted only parental knowledge and awareness.

In the study of Haerens and colleagues (2006a, b, 2007a, b), effects on fat intake, BMI *z* score and BMI were found in the intervention condition with parental support when compared to the school-only group and control group. The effects were, however, only seen in girls and effects on fat intake were not long lasting. Vandongen and colleagues (1995) stated that the intervention programs with a parental component had more positive effects on children's behaviours. Edmundson and colleagues (1996) (Luepker et al. 1996, 1998; Lytle et al. 1996) and Hopper and colleagues (1992, 1996) only found positive effects on children's nutrition knowledge, but not on behaviours when comparing the school-plus-parent intervention condition with the school-only condition. In one study, the parental component did not result in added effects (Werch et al. 2003).

The second purpose of this review was to get more insight in the characteristics of participating parents in school-based interventions. However, only one study provided information concerning this. In the study of Hopper and colleagues (1992, 1996), the majority of participating parents were physically active mothers.

Discussion

The present review has found that there is a lack of evidence to support the claim that parental involvement is important to improve effectiveness of school-based behavioural nutrition and physical activity interventions.

First of all, there is a lack of studies to test this hypothesis, and the few studies that are available provide inconsistent evidence. One study found some convincing positive effects of the parental component on children's behaviours (Haerens et al. 2006a, b, 2007a, b). They included more strategies and addressed more different determinants and parenting practices than the other home interventions. The intervention studies using take-home packets in the parental module also targeted a range of parenting practices. Notwithstanding, less convincing results were found from these studies (Edmundson et al. 1996; Luepker et al. 1996, 1998; Lytle et al. 1996; Hopper et al. 1992, 1996; Vandongen et al. 1995). Werch and colleagues (2003) used only one strategy to target two parental determinants and found no added results. Although the number of studies that could be included in the present review was small, it appears that studies including more strategies in the parental intervention component and focusing on more home-related factors are more likely to be effective. The systematic review of Golley et al. (2010) examined whether intervention content and behaviour change techniques employed in family-based interventions are associated with intervention effectiveness. They found that the variety of strategies included in a family-based intervention influences study effectiveness. Furthermore, focusing on parenting practices shows great promise based on associations between parenting practices and children's health behaviours (Birch and Ventura 2009; Koplan et al. 2005; Golan and Crow 2004). Moreover, Skouteris and colleagues (2010) and Lindsay and colleagues (2006) stated that the obesity prevention strategies focusing on changing parental variables related to obesity-promoting behaviours are promising.

Three of the five interventions that were evaluated in the studies included were explicitly informed by a theoretical framework. Theory-based interventions are more likely to be effective (Michie et al. 2008), but based on this review no conclusions could be drawn whether the use of a theory in intervention development increases intervention effectiveness. To improve our understanding of how interventions result in change, more information about how the theory informed the design of the intervention is needed, i.e. the choice of behavioural change techniques or intervention techniques (Abraham and Michie 2008; Michie et al. 2008). However, none of the studies systematically described the used behavioural intervention techniques. Therefore, it is not possible to link the implementation of certain intervention techniques to parental intervention effectiveness. Intervention duration could also influence intervention effectiveness. Findings of Summerbell and colleagues (2005), Kamath and colleagues (2008), and Peters and colleagues (2009) stated that interventions of longer duration appear to be more effective in changing children's nutrition and physical activity behaviours and weight. In the current review, intervention duration ranged from 6 weeks to 3 school years. However, no persistent link could be found between study duration and parental intervention effectiveness, mostly due to the low number of studies in each category.

The limited effectiveness of parental components could also result from the non-participation of parents in the home component. Unfortunately, only two studies included information about the degree of parental participation making it impossible to assess participation levels (Edmundson et al. 1996; Luepker et al. 1996, 1998; Lytle et al. 1996; Werch et al. 2003). Nader and colleagues (1996) examined dose effects of parental participation in the CATCH study and found that the dose was related to attitudes, knowledge, and beliefs, but not to children's health behaviours. According to the author, parental components need to be more intensive and extensive, which is supported by others reporting on the difficulty to address and involve parents in school-based activities (1988).

Other explanations for this limited effectiveness on children's behaviours could be that none of the interventions focused on feeding practices or family dynamics/systems despite associations between factors in the home environment and children's weight status (Kitzman-Ulrich et al. 2010; Rosenkranz and Dzewaltowski 2008). Identifying characteristics of participating parents in the included school-based interventions was not possible since only one study mentioned this. In the literature, a lot of information is available concerning determinants of parents participating in children's education, but not in obesity prevention programs. Identified demographic characteristics influencing parental participation in children's education are family income and education, parents' marital status, number and gender of children, parental attitude and self-efficacy and the relation with their children (Eccles and Harold 1996; Hoover-Dempsey et al. 1992). More involvement at school (e.g. classroom volunteering) was found in females, married parents, unemployed parents and parents with high levels of self-efficacy. More involvement in educational activities at home was reported by parents with lower education, lower family income, single parent status and parents with fewer children (Eccles and Harold 1996; Hoover-Dempsey et al. 1992).

The main strength of this article is being the first systematical review of studies with a design which makes it possible to identify the added value of parental participation. Nevertheless, the small number of studies and the large

differences in study designs, and methodologies preclude drawing clear and definite conclusions. Further limitations of this review are that most of the studies included were conducted in the United States. Only one was conducted in Europe and one in Australia, which raises questions about the generalisability of these results. Because of the English language limit some articles might be missed.

The current review found inconsistent evidence for the effectiveness of parental components on children's health behaviours. It appears that parental modules including more strategies and addressing more different determinants and parenting practices were more likely to be effective. There is a need for more studies comparing school-based interventions with and without a parental component. It is also recommended that studies focusing on parent modules include more descriptive information about content, strategies, focus and dose of parental participation to make more conclusive decisions concerning the effectiveness of parental involvement in school-based health behaviour interventions.

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Conflict of interest The authors declare that they have no conflict of interest.

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